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QUANTITY AND TENSION GALVANIC CURRENTS, WITH REFERENCE TO THEIR DIFFERING SURGICAL ACTION.[1]

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Owing to the fact that experimental researches into this important subject are rendered impossible to a great part of the profession, by reason of want of the necessary time and appliances to carry them on, it remains for the specialist in electro-therapeutics to supply the blank — to show what difference exists, and how. For the specialist, who understands the great law of Ohm to be the foundation of his studies as the mathematician knows the primary rules of arithmetic to be his, a simple reference to this axiom, which is as demonstrable as is the binomial theorem, would be sufficient; but in order to render the practical application thereof plain to all, in the above connection, a series of experiments have been made, and the results thereof recorded in this paper. The astronomer and the microscopist are guided in the use of their instruments by well-known and thoroughly-understood physical laws, which have existed sufficiently long and have been sufficiently investigated to make them plain to even a school-boy; and so they have a beaten track to follow. But the worker in electro-physics has but one compass to guide him over unsurveyed seas, one well-founded law upon which he may fully depend; and this is of so small moment to other persons that its bearings and teachings are scarcely known or cared for. It is the polar star of electrical science, it is the foundation of electrical law. By carefully studying and closely following it, important mistakes must be avoided; should it be neglected, through ignorance or carelessness, it is impossible to predict what catastrophe may be impending. Let us recite the law.

It is, "The quantity of electricity passing any given point in a circuit varies directly as the electro-motor force and inversely as the resistance." That is, its volume increases with increase of propulsive power, and decreases with increase of resistance. This being understood, we must next define the technical term "electro-motor force." It is that quality which by means of tension overcomes resistance to current flow,

[1] Read before the Providence Medical Association, June 5, 1876.

and is exactly proportionate to the number of galvanic cells employed, without reference to their respective size. It is that force which drives forward the current and varies only with the number of pairs, the metals composing them, and the nature of the exciting fluid. There being no other factors in its composition, it follows absolutely that two pairs unequal only in point of size, no matter how great *this* difference may be, will originate precisely the same amount of propulsive force. Tension is originated by electro-motor force, and may be defined as that quality by virtue of which substances intercalated in the circuit are penetrated or traversed, they being susceptible of such passage, so-called conductors or electrolytes.

Quantity means the amount of electricity passing a given point in a given time.

It will therefore be seen that these two terms are not convertible, are distinct, and mean totally different things. It is by virtue of its quantity that galvanism heats the cautery-knife or wire, by virtue of its tension that it decomposes water or a portion of animal tissue interposed in its course. The platinum knife or wire is heated by the quantity current in precisely the same way as is a piece of iron placed upon a blacksmith's anvil and struck with a hammer. Motion, by its sudden arrest, is transformed into heat, simply assuming an allotropic form, in strict consonance with the recognized laws of force. The current, passing along the copper conducting cables, meets with practically no resistance until it reaches the platinum, a resisting medium, but not an absolute bar. In forcing its way amongst the particles composing the knife or wire it becomes heat, and the platinum is rendered incandescent, while the copper conductors remain cold or are but slightly elevated in temperature. Should the platinum wire be made longer or be replaced by a sufficient quantity of animal tissue, or, in other words, the resistance be made effective, the current flow is arrested, and none of the characteristic signs of electrical action are seen, such as elevation of temperature, evolution of gas, or evidence of decomposition. The enormous resistance offered by animal tissue is the reason why a current evolved by any single cell is not only insufficient to produce any surgical effect therein, but is sufficient to entirely stop the deflection of a quantity galvanometer needle interposed in such a circuit. When the human body, from hand to hand, is intercalated, there is no single cell known that can produce a current which will pass through it, as I recently proved by a test with Dr. Piffard's new caustic battery, which, although sufficiently powerful to maintain a broad platinum knife at a white heat for an hour, produced no sensation whatever when the poles were held in the hands.

The second surgical quality of galvanism, tension, is alone capable of decomposing animal tissue by resolution. Tension currents are obtained

by augmenting the number of pairs and decreasing their size, for, as we have seen, this quality is increased with the number of cells, without reference to their size, and to employ a series of the large ones would make the instrument cumbersome and costly, without adding to its value in any way. All the *quantity* in a series of this class is obtained from the first two pairs, the rest acting as intensifiers or drivers thereof. So we increase the electro-motor force and tension by increasing the number of cells, and the electrolytic batteries in use to-day are so arranged as to permit this number to be varied at the will of the operator without breaking the circuit or causing any shock. Tension currents, possessed in the highest degree of the power of penetration, are the only ones, both in accordance with the law of Ohm and in the light of actual experiment, which can produce any surgical effect upon animal tissues, since they alone possess sufficient electro-motor force to overcome such great resistance as even an inch of flesh interposes. The dissolution affected in this way is usually termed electrolysis, a word exclusively employed to denote the effect of tension currents. The French have a much better way of distinguishing between tension and quantity than we, calling them galvano-caustique chimique and galvano-caustique thermique, — better, since both will produce cautery effects: quantity by direct heat applied through incandescent metal, tension by chemical decomposition produced in a mass of tissue interposed in its flow. As Tripier says, "By the galvano-caustique thermique the field of actual cauterization has been enlarged, by the galvano-caustique chimique that of potential cauterization." Only chemical decomposition by galvanism, and not the results obtained therefrom, is properly termed electrolysis, for this is really the preliminary step of a process of which the final one is the surgical effect. The action of the current separates organic liquids into acids and alkalies, and electrolysis is done when this is over. These acids and alkalies, obeying their affinities, enter into new combinations, and it is by this second step, precisely the *opposite* of decomposition, that surgical results are attained. The electrolytic power of galvanism has never been employed alone except in medical applications, where the products of electrolysis are received by and retained upon moistened sponge or chamois skin covering the electrodes. It would therefore seem better to adopt *in toto* the French nomenclature, or, if this cannot be done, at least to have our own term so explained as to prevent its being again defined as "the passage of a large quantity of galvanic current from over a dozen square feet of excited surface of the plates in the battery."

The instruments employed to measure quantity and tension are essentially different. In the first case the galvanometer is made of an astatic needle surrounded by a short, thick wire or band, offering small resistance; in the second, of the same needle, having the short, thick wire

or band replaced by a very long, thin one, with many turns, and since with increase in length of wire and number of turns comes increase in the delicacy of the instrument and increase of resistance, so a tension galvanometer cannot measure a quantity current, for the resistance of the long wire is so great as practically to stop it entirely.

Theory and practice are again one, the law of Ohm being supported by both, the current flow varying directly with electro-motor force and inversely with the resistance.

To measure the quantity of electricity produced by a very large and powerful single cell, *at the battery*, would require an instrument constructed with especial reference to that cell, since the resistance being very small the volume would be very large. But let a single inch of animal tissue be interposed between the poles and the volume then measured, and this instrument is useless, as we shall presently see. So much for theory; now for the experimental proof thereof.

Experiment I. — Battery used, single cell, alternate zinc and carbon plates, five inches by seven, twenty-eight in number. Exciting fluid, a saturated solution of bichromate of potash in a solution of sulphuric acid, one part to four. This instrument was in perfect order, having been successfully employed in several galvano-cautery operations since. The electrolyte was a square of beef, three inches in diameter, from the round of the thigh, and free from fat. The conductors were cables of pure copper wire, each five feet long, and containing one hundred strands. Flattened needles of steel were used as electrodes and were plunged into the beef so that their points were one inch apart. Into the intermediate space, and directly in the current track, was placed a thermometer bulb, and its observation intrusted to Dr. O. C. Wiggin. Temperature of meat 50° F., that of the room 78°. The plates were then immersed to the depth of five inches and allowed to remain six minutes. No elevation whatever of temperature was recorded by the thermometer, although directly afterwards one inch immersion of the plates heated to incandescence two inches of No. 23 platinum wire. No change was observable either in the color or texture of the beef.

Experiment II. — Battery used, Stöhrer's electrolytic series, as arranged by the Galvano-Faradic Manufacturing Company, of New York, composed of thirty-two pairs of carbon and zinc plates, one and one half by four inches. Of these but twenty were used, that being the number usually employed by me in ordinary surgical operations. Conductors were pure copper cables of ten strands, and the same electrodes as in the previous test. Temperature of cube of beef (fresh piece) 54°. The needles and thermometer being arranged as before, and battery immersed, in one minute the mercury stood at 68°, two minutes 70°, and in six minutes 90°. Circuit was then broken, and examination showed thorough destruction of tissue all around the negative pole, the

same to a smaller degree around the positive pole, and traces of decomposition throughout that portion in the track of the current.

Experiment III. — Battery same as in the last trial, and number of cells increased to twenty-eight. Four small steel negative needles were inserted into a fresh cube of beef, their points encircling the thermometer bulb in such manner that they were distant from it an inch, and the circuit completed by a single large, flat positive needle, inserted two inches from the others. Temperature of beef 55°. The plates were immersed, and in fifteen seconds the mercury marked 60°, in one minute 64°, two minutes 76°, three minutes 90°, four minutes 105°, five minutes 115°, and in six minutes 126°, when the current was broken. Upon removing the needles and examining the beef, it was found that not only was structural disorganization complete around both poles, but in every part of the current track between them. The last two experiments were accompanied by copious evolution of hydrogen gas, and a crackling, bubbling sound.

Experiment IV. — Battery same as in first test, except that the single cell was broken up into four, so as to increase by four times its value as a cauterizing battery. The same four negative needles were used as in the last experiment, and everything arranged exactly as before. Temperature of beef 60°, having risen slightly from the heat of the room. Battery fully immersed, and in one minute the thermometer marked 61°, in two minutes 62°, three minutes 64°, five minutes 64½°, and in six minutes 65°. The needles were then withdrawn, and a close examination of the beef failed to show any sign whatever of galvanic action.

Deeming these experiments conclusive, so far as surgical result was concerned, the next step was to measure the amount of electricity flowing through the resistance offered by an inch thickness of animal tissue, as accurately as possible, by means of quantity and tension galvanometers.

In making these tests I was aided by my young friend Mr. Arthur Webster, who has devoted considerable time and labor to the study of electro-physics.

Experiment V. — Battery used, galvano-caustic, single cell, fourteen plates, with fresh fluid. Galvanometer, a tension instrument from Chester, of New York, sufficiently delicate to show distinct needle deviation from a single quart Smee cell, after the current had traversed the resistance of the whole body, from hand to hand. Battery was fully immersed and circuit closed through the galvanometer, at the battery, with complete rotation of the aluminium indicator. It was then closed through one inch of beef, and the same result followed, the needle moving a little slower. This was repeated twice, and the great cell replaced by a four-ounce Grenet, with a single pair of zinc and carbon plates, one by four inches. Precisely the same rotation followed closure of the circuit, showing both cells to have possessed the same electro-motor force.

The tension galvanometer was then replaced by a similar instrument arranged for quantity, made by Thomas Hall, of Boston, and the great cell again immersed. Closing the circuit at the battery, the needle swung round to 48° on an arc of 90°, slowly falling, until in one minute it stood at 40°.

The plates were next removed from the solution, well washed in hot water, dried, cell refilled with fresh liquid, and circuit closed through one inch of beef, the same broad steel needles being employed as electrodes. *The galvanometer needle remained motionless.* The circuit was repeatedly broken and current direction reversed, but the needle made no sign; the resistance was complete, so far as quantity was concerned.

Experiment VI. — Battery used, Stöhrer's series, the same as before, with quantity galvanometer. Closing the circuit through the inch of beef no current was registered, although the crackling sound of gas evolution was plainly audible, and, upon removing the needles, decomposition was well marked around both poles.

With the last test the examination was concluded, and it seems to have demonstrated the facts that a quantity galvanic current is totally unable to produce any surgical effect upon so small a portion of animal tissue as an inch of beef, the resistance offered thereby being too great for the electro-motor force of any single cell to overcome, and, consequently, that this current should not be employed where chemical dissolution is sought; and, in the second place, that tension currents, from their great penetrative force, are alone capable of causing any chemical change in such an electrolyte as flesh.

As I have stated in a previous address, the solvent effect of galvanism upon hard tumors, such as fibroids, is regarded as injurious, since absorption of the products of decomposition cannot take place, from the lack of absorbents in such growths; and that, in my opinion, the sole result of such interference is the formation of foci of pus about the points of the needles used as electrodes. There is no doubt that the conducting power of living tissue is much greater than that of dead, on account of the warm saline fluids contained therein during life, which are by far the best electrolytes in the body, but it will be remembered that fibroids are but sparsely supplied with blood, and a few tests with the tension galvanometer proved that the beef contained sufficient fluid to render it an excellent conductor. I do not think there is any difference in that respect between a living fibroid, with its great density, and a dead piece of beef with its loose cellular structure filled with fluid.

I have been furnished by my friend Dr. J. W. Mitchell with the results of post-mortem examination in one case where this operation resulted fatally, and they, too, support fully the accepted theory upon the subject. He states that while the needle punctures were plainly visible in the tumor at the time of death, five weeks after the operation, and

although the tumor was not a true myxoma, but a fibro-cystic growth, and thus more susceptible to galvanic action than a more solid mass, there was not the smallest evidence of such action having occurred, either from the presence of pus or other evidence of chemical dissolution about the needle points or in the track which the current, had there been any, must have taken between them.

In this connection Morgan states, in his great work upon Electro-Physiology and Therapeutics, "In order to be decomposed by the galvanic current the individual particles of the electrolyte must be freely movable in all directions, so as to follow at pleasure electrical attraction or repulsion, and hence it must be a semi-solid, liquid, or gas."

If this be correct, and experience testifies to its truth, it follows that a hard tumor like an uterine fibroid is not a proper case for galvano-puncture; and I trust that the gentleman who published an article upon this subject in the JOURNAL for February 17th, of this year, will be satisfied that it is no longer "an open question whether the galvanic current (as used by him) has anything to do with the dispersion of uterine fibroids, or whether the same results would not be produced by the needle-punctures without the electricity," for I claim that the experimental results recorded in this paper demonstrate that in his cases, with his published method of using a single-cell battery, no current passed between the electrode points which was sufficient to produce the smallest effect of any kind whatever, and consequently that the punctures must have accomplished all that was done.

TRANSFUSION AND AUTO-TRANSFUSION.[1]

BY C. S. MINOT, M. D.

THREE medical questions have excited general interest in Germany during the past few years: (1) military surgery, (2) avoiding the loss of blood in operations, and (3) transfusion, which has been very generally discussed, though with little result. Here physiological experiment proves more profitable than clinical observation, and the author turns to that.

He begins with the account of a simple experiment. If the vena jugularis of a small dog be connected by a system of tubes and canulæ with the carotid of a large dog, the blood of the large animal passes over into the smaller, which soon begins to struggle, but then becomes quiet, and the activity of the respiration is diminished. The large dog at first remains still, but the loss of blood causes after a short while a quivering of the muscles, the breath is drawn deeper and more rapidly.

[1] Abstract of a lecture delivered by Dr. Lesser before the Berlin Gynæcological Society, December 1, 1874, and published in Klinische Vorträge, No. 86.

Somewhat later the cramps accompanying loss of blood begin. Meanwhile, in the small dog, the vessels are found swollen, and the eyes project. If the experiment be now interrupted, the smaller animal runs about, all right. The larger animal lies motionless, the flow of blood from the carotid has almost ceased. If the artery is closed, the head lowered, and the limbs compressed, so as to drive the blood from the extremities and the abdominal cavity to the central regions, the animal begins to breathe again, and if the carotid is then re-opened the flow of blood begins anew, continuing till death follows. Upon weighing the small dog it was found, after the experiment described, that its quantity of blood had been doubled without producing any immediate harm.[1]

This large addition of blood does not produce extravasations, but remains for the greater part in the vessels, as shown by Worm-Müller. The arterial pressure is not, however, hereby increased, because the elasticity of the walls of the vessels is changed in a peculiar way; the capacity of the vascular system is thereby increased sufficiently to take up the extra blood without any rise of pressure. As the limits of this power of self-accommodation lie beyond the quantity of blood which might come into consideration in making a therapeutical transfusion, the fear of producing a dangerous rise in the pressure in the vessels by transfusion is unfounded, except, at most, in cases of certain diseases of organs in which any rise of the blood pressure might be followed by dangerous effects. The author makes other extremely important applications of this new discovery.

From animals whose blood has been doubled by transfusion, only a part of the blood can be recovered, and the animals *die* by bleeding *before the quantity of blood has reached the normal level.* If, however, the extremities be wrapped up in Esmarch's bandages and all means used to drive the blood towards the heart, the circulation recommences, and the pressure in the carotids, which was very low, rises again. In this way the life of the animal may be saved.

This method has been called auto-transfusion by the French, and seems destined to become of the greatest value, and has already been used with success, though not many trials have been made of it. The author enumerates the following indication for its use: —

(1.) Small loss of blood, before having recourse to transfusion, and before and after surgical operations.

(2.) In cases of anæmia, before and after operations by which a fresh loss of blood is unavoidable.

(3.) Operations requiring the inhalation of chloroform, in cases of anæmia, as the pressure of the blood is lowered by the influence of the chloroform, according to Lenz, Brunner, Scheinesson, etc.

[1] Cf. L. Lesser. Ueber die Anpassung der Gefässe an grosse Blutmengen. Berichte mathematisch-physische Sachsische Gesellschaft der Wissenschaften, 1874. This research was made in Professor Ludwig's laboratory in Leipzig.

(4.) It should always precede transfusion itself, especially in cases of loss of blood, as by it life may be maintained during the critical moment, which is often lost in preparing the instruments for the transfusion.

If the auto-transfusion suffices, it shows that a transfusion is unnecessary, and becomes in this way a good means of diagnosis.

The author then discusses the various forms of anæmia in their relations to the quantity of blood and its pressure.

In the author's experiments the transfusion was, of course, made with the natural blood. The principal danger in this case is that of coagulation or the introduction of air, which the author reduced to a minimum by using merely two canulæ, one for the artery and one for the vein, and connecting them by short bits of rubber tubing, with an intermediate glass tube. He recommends direct transfusion, and to avoid complicated apparatus. For indirect transfusion he considers a constant pressure of mercury, and adds that preliminary warming of the blood is unnecessary, as a cold temperature delays the coagulation, and Malgaigne, Polli, and Casse found no harm to be done by the injection of blood at the ordinary temperature.

Since the introduction of defibrinated blood diminishes the coagulability, transfusion with it must be rejected when there is a fresh wound, or escape of blood.

Transfusion is a means of saving life, the loss of which is imminent either from certain acute diseases, want of blood, or asphyxia of the tissues. It is evident that for man undefibrinated human blood is the best, but the blood of animals may be used when it has no poisonous influence on the system. It is desirable to find some animal which may be obtained more readily than lambs, and the proposal to try dogs is worth experiment.

Dr. Lesser ends his interesting and original lecture with a final recommendation of auto-transfusion.

EMBOLISM OF THE PULMONARY ARTERIES IN CONSEQUENCE OF THE APPLICATION OF ELASTIC BANDAGES TO THE LOWER EXTREMITIES (ESMARCH'S METHOD.)[1]

BY J. V. MASSARI.

THE bandages were applied after a confinement in which the patient, in consequence of placenta prævia, had become extremely anæmic, and was but insufficiently affected by restoratives. The symptoms of anæmia disappeared remarkably quickly, and returned again immediately, when, in consequence of violent pain, the bandages were twice loosened

[1] Translated, by H. P. Bowditch, M. D., from the Wiener medicinische Wochenschrift, 1875, No. 48, noticed in Centralblatt für die medicinische Wissenschaften, 1876, page 368. This is an instructive commentary on the last article. — EDS.

for a short time. Their third removal, thirty-two hours after delivery, was followed by sudden collapse, dyspnœa, violent heart-beats, and death in two hours, in spite of a re-application of the bandages.

Clots were found in the pulmonary arteries of the third order, and similar ones in the varicose saphena veins. The author regards the bandaging as the cause of the coagulation, and considers its employment contra-indicated by a varicose condition of the veins. He also gives a caution against the too prolonged application of the bandages.

CASE OF SLOUGHING OF THE SCROTUM; RECOVERY WITHOUT CASTRATION.

BY DRS. I. F. GALLOUPE AND T. T. GRAVES, OF LYNN.

On the 29th of December last, F. B., twenty-one years of age, and in good health, while at work near a revolving shaft moved by steam power had his apron and pantaloons caught and entirely torn off. On examination it was found that the scrotum had been included with the clothing, and torn off entire as far as the inguinal canals; on the right side the wound extended somewhat higher than that point, the skin covering the penis was torn, and that of the perinæum stripped off back to the anus. The testes and spermatic cords were left uninjured, but completely uncovered.

It was thought best to replace the scrotum, hoping that a portion of it at least would not slough, which hope was not entirely disappointed. The only alternative seemed to be to remove the testicles, to do which all that would have been necessary would have been to cut the cords and secure the vessels. During the examination, and at the dressings subsequently, the testes were separated and laid upon the groins, to bring the wound of the perinæum the better into view. On the third day the scrotum had sloughed, except a piece about an inch and a half square upon the left side of the penis. The entire wound was dressed with cotton-wool soaked in an aqueous solution of carbolic acid, and no other dressing was used throughout the treatment. Healthy granulations soon covered the wound and testes; the spermatic cords began to shorten, and soon drew the testicles into contact with the external inguinal rings. The wound healed rapidly, the relic of the scrotum growing until the left testis was covered. The right one being still bare, it seemed as though it would be necessary to remove it. On examining the wound, however, on the 5th of February (the patient had not been seen for several days previously), it was found to have disappeared of its own accord, by escaping under the skin of the groin, and lay above the pubes. There it still remains, giving no discomfort or inconvenience whatever to the patient. The entire wound is now (February 27th) healed.

RECENT PROGRESS IN THE STUDY OF MENTAL DISEASES.

BY THEODORE W. FISHER, M. D. HARV.

DIAGNOSIS.

THE modern idea that insanity is always and only a disease of the brain has been wrought out in the last few years, until the various forms of mental disease are as thoroughly based on corresponding pathological changes as are the symptoms of disease in other organs upon their pathology. The exact relation between symptom and lesion is of course often obscure, as in other diseases, since our knowledge of cerebral physiology is imperfect, but recent research is every day throwing new light on the dark corners of the brain.

The first question of importance to be solved is whether insanity is dependent on one fundamental abnormal state or on many. According to Griesinger[1] there are two grand groups of symptoms, which represent the two most essential varieties of insanity. In one the disease consists "in the morbid production, governing, and persistence of *emotions* and *emotional states*, under the influence of which the whole mind suffers, according to their nature and form." In the other it consists in "disorders of the intellect and will, which do not any longer proceed from a ruling emotional state, but exhibit, without profound emotional excitement, an *independent*, tranquil, *false mode of thought* and of *will*."

Experience shows that the former condition of emotional insanity, in many if not in most cases, precedes the latter state of intellectual insanity, and is the cause of it when not cured or arrested. The different stages, rates of progress, and succession of phenomena in these two states constitute the different varieties of insanity. By a thorough practical knowledge of these forms "it is now possible to approach much more closely than ever to the problem of an anatomico-pathological knowledge and diagnosis of mental disease."[2] In the first group it is rare to find important organic alterations, while in the second they are almost constant. While it is confined to the primitive or emotional stage, insanity is quite curable; with the development of secondary symptoms it becomes incurable. The first group includes the forms known as melancholia, mania, and monomania; the latter, chronic mania and dementia.

Insanity may therefore be considered, theoretically, as one disease with two periods, in which the brain, like many other organs, is affected first functionally and then organically. But there are still other subdivisions which practically amount to separate diseases, since they may

[1] Mental Diseases, page 207.

[2] Griesinger, loc. cit.

continue for a long time without passing into any other form. As with other organs, the functions of the brain may be morbidly depressed or stimulated, giving rise to corresponding states of melancholia and mania. This depression and this excitement may be general or partial, and affect simply the emotions or involve also the intellect and will. The depression may result in a state of indifference and stupor (mental anæsthesia), or in a state of irritation in which all moral impressions are exquisitely painful (mental hyperæsthesia).

As emotional states tend eventually to affect the intellect and will, so states of depression naturally tend by reaction to pass into states of exaltation. The painful self-concentration of melancholia finds relief, at last, in a persistent excitement and exaltation of the will, with an increase of self-sensation and self-confidence. The motor side of the brain becomes affected in its turn, and irregular and extravagant action takes the place of perverted sensation. When any of the preceding states have become permanently established, we have, with a partial or complete subsidence of emotion, either organized states of delirium known as delusions or fixed ideas (chronic mania), or an obliteration of the intellect more or less complete (dementia).

PATHOLOGY.

As to the nature of the cerebral changes which correspond to the forms of insanity described we are still considerably in the dark. We know, however, that functional insanity, if the expression is allowable, is due to disorders of the cerebral circulation, and consequent excess or deficiency of nutrition depending on influences direct or reflex, and specially related to hereditary constitution or temperament. Dr. J. Batty Tuke, elaborating Skae's definition, says,[1] "Insanity consists in morbid conditions of the brain, the result of defective formation or altered nutrition of its substance, induced by local or general morbid processes, and characterized especially by non-development, obliteration, impairment, or perversion of one or more of its psychical functions."

The phenomena of insanity in its early stages cannot, however, be properly called functional, since lesions no doubt exist, which are evanescent, disappearing alike upon recovery or death. Fox in his recent valuable work[2] says there are four conditions which leave no trace: (1) changes in the quality of blood; (2) in quantity; (3) reflex irritation; (4) shock. It is in the early stages of mental disease that its true pathology is to be observed, the numerous changes seen after death in more chronic cases being secondary, not to the mental phenomena but

[1] Edinburgh Medical Journal, November, 1874.

[2] The Pathological Anatomy of the Nervous System. By Ed. Long Fox. With illustrations. London. 1874.

to early organic changes, once amenable to treatment. The nature of these changes can be known only by means of clinical observation, or in part inferred from the later or secondary lesions. Since "disease is nature's most delicate experiment,"[1] clinical observation has taught us the most. Dr. Thompson, of Bristol, England, discovered, by means of sphygmographic tracings, that persistent spasm of the arteries was one of the earliest phenomena in general paralysis.[2]

Authorities differ as to whether the vascular or the nervous tissue is first affected in insanity. Symptoms from both sources are so nearly contemporaneous as to be indistinguishable in point of time. Many cases seem evidently of vascular origin, as anæmia from hæmorrhage, hyperæmia from general plethora, and delirium from toxic conditions of the blood. On the other hand, shock induces a paresis of absorption and reflex irritation, a condition unfavorable to osmosis, apparently through their action on the nerve cells. We know little of the true mode of cellular action, but there is reason to believe that some forms of mental and nervous disease consist in a discharge of force, as in the "discharging lesion" of epilepsy, as J. Hughlings Jackson calls it. So in hyperæmia induced by brain fag, worry, or other moral causes, or in the "psychic intoxication" produced by sudden good news, it seems probable that the nerve cells first feel the influence of the exciting cause.

The mode of conduction in nerve fibres is of great importance in the study of cerebral physiology. Brown-Séquard's theory of a special fibre for each kind of impulse transmitted is a complex one. Every complete nerve, he claims, must have at least eleven kinds of fibres. But this view is negatived by the fact that after union of severed nerves these various functions are carried on as well as ever. It is improbable that each fibre should unite only with one of its own kind. So, too, a sensory nerve may be made to unite physiologically with a motor one.[3] The theory of Dr. Robert McDonnell[4] is much more simple. He thinks that the peripheral expansions of sensory nerves are able to take up undulations or vibrations and convert them into waves capable of being transmitted along nervous fibres; so that the same nerve tubule may be able to transmit vibrations of different character and giving rise to differing sensations. The idea of heat and the idea of contact may be excited by the different character of the waves propagated by the same nerve-fibre. So in the optic nerve the undulations exciting the idea of red or of blue may pass along the same course, differing only in rate. This corresponds with what we know of sound as conducted through different media, the pitch depending on the rapidity of the sound waves,

[1] Fox, page 5.
[2] Fox, page 177.
[3] Philadelphia Medical Times, January 8, 1876.
[4] Lectures and Essays, Part II., page 220, Dublin, 1875

and it is certain the auditory nerve must be adapted to taking up these varying sounds and to transmitting the essential characteristics of each. By the same theory ideas of differing nature may traverse the same or perhaps any fibres, and thereby be reflected or spread, as it were, in any direction.

Cerebral hyperæmia is an early and constant symptom in all forms of insanity. Clinical observations show this fact, which is not disproved by the negative results of some autopsies, since emptiness of the capillaries after death does not prove that they were not distended during life. Dr. Fothergill remarks[2] that "there are two factors in the production of localized hyperæmia: (1) an increase in the blood pressure generally, the vascular factor, and (2) a change in the tissues themselves, by virtue of which they attract more blood; this is the tissue factor." He is inclined to attribute modifications of function to some unknown cause other than disturbances of vaso-motor and vaso-inhibitory centres. He mentions three forms of cerebral hyperæmia: that of vascular origin, encephalic fullness without general vascular excitement, and that produced by drugs. It is the second form which is usually present in mania, and the hyperæmia is no doubt as often due, primarily, to augmented cell activity inducing excessive vascularity, as the reverse.

Where the hyperæmia has disappeared after death, its recent presence may be inferred from sub-arachnoid hæmorrhages, minute aneurisms, and crystals of hæmatoidine. Dr. Tuke in his Morrisonian Lectures mentions the following changes which he has observed in the cerebral vessels, in one hundred cases of insanity, mostly chronic: (1) simple dilatation; (2) exudation; (3) opacity of the hyaline membrane; (4) dilatation of the retaining canal; (5) hypertrophy of the muscular coat.

Delirium. — Dr. Fox[2] thinks delirium is always due to loss or perversion of function from deficient blood supply. It is most frequent in anæmic conditions from exhausting disease. In toxic states of the blood the deficiency is due to part of the blood being useless for nutritive purposes, and in hyperæmia to pressure which renders interchange of elements difficult. Delirium tremens is due, he thinks, to the products of the decomposition of alcohol, which may accumulate in the blood for some time after the deprivation of liquor. The convulsions of alcoholism and uræmia are so similar as to suggest similar causes.

The idea that in all irregular nervous action there is deficiency of function from deficient nutrition is insisted on by Dr. Fox[3] in his Introduction. He says, "Not only are rigor, tremor, spasms, convulsion,

[2] West Riding Reports, 1875, page 173.
[2] Fox, page 159.
[3] Fox, page 3.

mere varieties of the same condition, but they are closely allied to incoördination, and through it to paralysis. The same may be said of the connection of excitement, delirium, and mania with dementia, fatuity, and coma." As a rule, excited and irregular action of any nervous centre is due to the removal of the inhibitory or controlling action of a higher centre.

Mania. — It is impossible to draw distinctive lines in the pathology of the early stages of insanity, so that the description of morbid appearances in mania will answer nearly as well for acute melancholia. This would follow naturally from the fact that the two forms are but different phases or stages of the same disease. In mania as in delirium the vascular system is especially affected. Greding found the choroid plexus normal in but four cases out of one hundred in mania, and in sixteen out of two hundred and sixteen in cases of insanity generally.[1] The hyperæmia of the cortex may disappear at death, but can often be inferred from its results, such as extravasations into the pia mater, minute aneurisms, dilatations of vessels, diffuse encephalitis, etc. A lesion not constant, but rather characteristic of acute mania, is inflammatory softening of the middle layer of the cortex. Lockhart Clarke and others have described eight layers, but the division into three is in accordance with the arrangement of vascular branches. It is this red softening of the middle layer which allows the superficial layer to peel off, as it is so often seen to do, leaving the appearance of a ragged ulceration of the cortex. This softening, or rather the hyperæmia which precedes it, Dr. Fox thinks, accounts for the incoherence or loss of sequence of ideas in mania. A rapid flow of ideas with loss of association, or a jumping from one to the other, is very characteristic of acute mania, and may be reasonably referred to hyperæmia of the middle layer of the cortex.

General Paralysis. — Dr. Thompson's sphygmographic observations, already referred to, show that the vascular system is early affected in general paralysis. The period of persistent arterial spasm is the one in which alone treatment can be of any avail. The use of calabar bean seems to be indicated by this symptom, since it lowers the arterial tension. The writer has found a slow and tense pulse in the early stages of other forms of insanity; in acute mania and melancholia and hysterical mania, for instance. Recently, in a case of recurrent mania, the patient having sought advice at the first warning of a return of the attack, the pulse was but 38 per minute, and this in a man who had been in excellent health for a year.

The cause of this arterial tension in general paralysis has been sought in the sympathetic ganglia, but its pathology is not well understood. The mania in this disease is probably due to hyperæmia of the middle

[1] Fox, page 198.

layer of the cortex, as red softening of this layer, followed by hardening and atrophy, is frequent. The morbid appearances found in the later stages of general paralysis are numerous, but comparatively unimportant because secondary and common to some other forms, senile dementia, for instance. They have been described by many observers.[1]

The lesions observed in other forms of chronic insanity are also numerous. W. G. Balfour records over eighty forms of abnormality or lesion in seven hundred post-mortem examinations.[2] Any one who will take pains to go through an asylum for the insane, taking shapes of heads with the *formateur* of the hatter, will be astonished at their small size, want of symmetry, and other irregularities, as compared, age for age, with other heads whose owners are accounted sane. It is believed that the hereditary element is often handed down in the shape of the cranium.

The conclusions upon the average weight of brain in the insane are summed up by Dr. Fox briefly as follows:[3] (1.) The weight of the whole brain is somewhat less in the insane than in the sane. (2.) The weight of the cerebellum, pons, and medulla is rather more in insane males than in the sane. (3.) Therefore the loss of weight is at the expense of the cerebrum. (4.) The weight of brain does not always bear an exact proportion to the intellectual power. (5.) The depth of the gray matter should be taken into the account. (6.) No particular disease except idiocy is associated with a light brain. (7.) Dr. Bucknill finds an average lower specific gravity in the brains of the insane, due possibly to a kind of fatty degeneration without diminution of volume.

Some of the lesions of vessels have been mentioned. Dr. Tuke found also (1) molecular pigmentation and fuscous degeneration of the nerve cells, (2) atrophy, (3) hypertrophy with an inflated condition. Dr. Grey, of Utica, from a microscopic examination of fifty-two cases concludes that the vessels are first affected.[4] Syphilitic disease of the vessels has been described by many observers of late.[5] In dementia, secondary to mania, an increased amount of peri-vascular protoplasm, and growth of interstitial connective tissue are usually found.

LOCALIZATION.

It is certain the cortex is the seat of lesion in insanity, since no extensive disease of it has ever been observed without mental derangement or weakness. Lesions of the membranes or convolutions are

[1] See Archives de Physiologie, Mars et Avril, 1875.
[2] Fox, page 190.
[3] Fox, page 189.
[4] American Journal of Insanity, 1874.
[5] Tuke, Journal of Mental Science, January and October, 1875; Clouston, Edinburgh Medical Journal, July, 1875; Stedman and Edes, Journal of Mental Science, April, 1875

almost invariably found in chronic cases of insanity, and where examination is possible in recent cases, indications of hyperæmia or diffuse inflammation of the cortex abound. It is also nearly certain that the anterior convolutions are affected in those forms involving especially the intellect and will; while the posterior convolutions suffer in emotional forms. The belief has long prevailed, though on rather insufficient anatomical grounds, that the motor and sensory tracts were related through the corpora striata and thalami optici, with the anterior and posterior parts of the cortex. The proofs of this view accumulate under the labors of Ferrier[1] and his collaborators. They are also strengthened by the clinical observations of Hughlings Jackson and J. Crichton Browne.[2]

The phenomena of hysteria have an important bearing on this question of localization. In the hemiplegic variety especially, modifications of cutaneous sensibility and of temperature are often associated, anæsthesia with pallor and coolness being followed by hyperæsthesia and a rise in temperature, with redness and local perspiration. These disorders of sensation are probably due to irritation affecting the optic thalamus of the opposite side. Uspensky[3] has localized a vaso-motor centre in this immediate vicinity. The mental symptoms may naturally be referred to those posterior convolutions most nearly associated anatomically with the thalami.

This view seems to be confirmed by the fact of the frequent occurrence of pain or distressing sensations in the back of the head in nervous and emotional cases. In females, cerebral exhaustion is often indicated by obscure pain in this region.

Hypochondriasis in the male, which is the analogue of hysteria in the female, has by inference a similar location. Careful observation of cases of this class, whose most prominent feature is morbid perversion of feeling and of general and organic sensation, points directly to a location in the sensory tract, including the higher or emotional centres.

The exceedingly instructive lectures of Dr. Broadbent on the Theory of the Construction of the Nervous System[4] should be carefully read by all interested in this question of localization. By the aid of recent researches he is enabled to locate the centres of general sensation in the optic thalami; here impressions are transmuted into crude sensations. The perceptive centres are in the convolutions to which radiate each kind of sensory fibres, each perception having its special seat. For instance, the visual perceptive centre is in the angular gyrus around the end of the fissure of Sylvius; the auditory near the apex of the

[1] Experiments on Sense Centres in Monkeys, British Medical Journal, August 28, 1875.
[2] On the Functions of the Thalami Optici, West Riding Reports, 1875, page 227.
[3] Virchow's Archiv, 1866.
[4] British Medical Journal, March, April, etc., 1876.

temporo-sphenoidal lobe. The perceptive centres are bilaterally associated with those of the opposite hemisphere through the corpus callosum. The ideational centres, on the contrary, occupy the superadded convolutions (*i. e.*, peculiar to man) which receive no converging fibres from the thalami, and are not bilaterally associated with those of the opposite side.

The transmission outward of the results of intellectual operations is from the superadded convolutions to the motor centres of Hitzig and Ferrier, thence to the corpus striatum and downwards to the cord.

In all gross lesions of the brain the localization of function would be aided by a use of Machlan and Stewart's charts of the convolutions. A correct knowledge of the distribution of vessels is also important, as few anastomoses are found between branches of the cerebral arteries. M. Duret [1] has made a careful study of the branches which supply the cortex, and finds that the anterior cerebral supplies the gyrus and sulcus rectus and the olfactory bulbs, and then divides into (*a*) anterior, (*b*) middle, and (*c*) posterior internal frontal branches. The artery of the fissure of Sylvius gives out four branches: (*a*) inferior external frontal, (*b*) anterior, (*c*) middle, and (*d*) posterior parietal. The three branches of the posterior cerebral are the anterior and posterior temporal and the occipital. Dr. J. H. Jackson thinks that in epilepsy the nervous discharge is limited to certain areas of arterial distribution.

EXPERIMENTAL PHYSIOLOGY.[2]

No better proof can be given of the great progress recently made in experimental physiology than the appearance of the volume before us. The object of the author is to furnish a complete manual of all the technicalities of physiological experimentation, thus enabling the special student to undertake an investigation with a full knowledge of the methods best adapted to attain the end he has in view, and furnishing the teacher of physiology with a series of demonstrations suited to convey to his audience a knowledge of the experimental basis on which this science rests. Both in the range of its subjects and in the minuteness of its details the work is far superior to Sanderson's excellent Handbook for the Physiological Laboratory, which is the only other book with which it can be compared.

The first chapter contains general directions for experiments on animals, directions which Professor Cyon's well-known skill and success as an operator well qualify him to give. On the subject of vivisections two of his rules are well worth quoting: —

'I. Never proceed to a vivisection without having first proved the impossi-

[1] Archives de Physiologie, 1874.

[2] *Methodik der physiologischen Experimente und Vivisectionen.* Von E. Cyon. Mit Atlas. Giessen und St. Petersburg. 1876.

bility of attaining the desired object (especially in demonstrations) in any other way.

"II. When not altogether inconsistent with the nature of the experiment, always produce a preliminary narcotization (by chloroform, chloral, opium, etc.)."

The author condemns, in the most unqualified manner, a hasty and careless style of vivisection, and concludes his excellent advice as follows: "Always operate on animals as if after the vivisection they were to be kept alive under the best possible conditions." This chapter contains also valuable directions for the choice, care, and feeding of animals destined for experiments.

In the following chapters are found detailed descriptions of an immense variety of experiments illustrating thoroughly the physiology of the circulation, respiration, and secretions, and the functions of the nerves and muscles. An atlas of fifty-four plates renders these descriptions perfectly intelligible, and indeed, by the clearness and minuteness with which complicated apparatus is figured, seems often to make a descriptive text unnecessary.

The methods of studying the physiology of the organs of sense and of psycho-physical research will be described in a second portion of the work, which is promised in the course of the current year. B.

RHODE ISLAND MEDICAL SOCIETY.

The sixty-fifth annual meeting of the Rhode Island Medical Society was held in Franklin Lyceum Hall, June 14th, at ten o'clock, Dr. George W. Jenckes, of Woonsocket, president, in the chair.

The report of censors and records for last annual and quarterly meetings were read and approved.

Dr. F. H. Peckham, Jr., treasurer, presented and read his annual report, which was received and ordered on file. Receipts, $416.12; expenditures, $421.18; reduction of debt, $45.94.

Dr. F. L. C. Garvin, for committee on publications, reported that four hundred copies of papers read before the society and proceedings at meetings had been printed, at a cost of $140.25, and were ready for distribution at this meeting. Report was received, and treasurer directed to distribute the same, one copy free to each fellow and additional copies at fifty cents each.

Dr. W. E. Anthony, for the special committee in the case of Dr. Thomas Mathewson, accused of practicing abortion, made a report, including the report of the censors on the case, recommending his expulsion from the society. Report was received and adopted.

On motion of Dr. Mann to expel Dr. Mathewson for violation of the rules of the society, a vote was then taken, and Dr. Mathewson was expelled by a vote of more than two-thirds of the fellows present.

Dr. W. E. Anthony, delegate to the annual convention of the American Medical Association, at Horticultural Hall, Philadelphia, Tuesday, June 6th, read a written report of the meeting, with a brief digest of its proceedings, which was received.

The president invited delegates from other medical societies to take eligible seats and participate in the proceedings of the meeting, cordially welcoming all visiting delegates. Dr. Samuel Lilly of the New Jersey, Dr. William A. Lewis of the Connecticut, Drs. Robert T. Edes, D. Homer Bachelder, Chauncey A. Wilcox, and George W. Snow of the Massachusetts societies were severally introduced, and spoke briefly for the societies they represented and warmly expressed their thanks for their cordial welcome.

President Jenckes read a letter from Dr. M. Wedgewood, appointed delegate from the Maine Medical Society, excusing his absence from this meeting, and inviting delegates from this society to attend the annual meeting of the Maine society to be held at Portland.

Dr. S. A. Arnold, secretary, read the annual report of the trustees of the Fiske fund, which was received and ordered to be recorded. The report shows a balance in the hands of the trustees of $1242.64. The trustees make no awards of premiums on the subjects offered for essays last year. For the best dissertations on the following subjects, or either of them, the trustees offer the premium of $200 for this year: —

First. What is the best means, civil, social and medical, that can be used for the prevention of disease?

Second. The causes and nature of cerebral disturbances, so frequently occurring, especially those following active mental exercise.

The trustees present their annual fees to the printing fund, to be used only for printing the prize dissertations, or to increase the printing fund.

Dr. W. O. Brown stated that the State Board of Pharmacy, which was chartered by the general assembly, upon the petition of this society, six years since, had become a very useful and successful institution, and should receive recognition and encouragement from this society. He presented several copies of the annual report of the State Board of Pharmacy for 1876. The report shows that there are eighty-four registered pharmacists and thirty assistant pharmacists in the State, and expresses the satisfaction of the board with the successful and harmonious working of the law since its enactment six years ago, and the beneficial effects resulting therefrom.

The report of the board of censors was read by the secretary, received, and ordered recorded. Request of Dr. J. Laing Clark to resign his fellowship, recommended by the censors, all dues being paid, was granted by the society. Petition for expulsion of a member was continued to next meeting. The board nominated Drs. George L. Collins and James H. Eldredge for delegates to the International Medical Convention to be held in Philadelphia, September 6th.

Report of board upon charges made against Dr. Thomas Mathewson, of Providence, was amended and adopted.

Dr. S. S. Keene was appointed anniversary chairman for next year.

The annual election of officers was then proceeded with, and the following-named candidates were elected officers of the society for the ensuing year, after Dr. Jenckes had been reëlected president and declined: President, Dr. Edwin M. Snow, Providence; First Vice-President, Dr. Charles H. Fisher, North Scituate; Second Vice-President, Dr. Edward T. Caswell, Providence;

Recording Secretary, Dr. Walter E. Anthony, Providence; Corresponding Secretary, Dr. Edward M. Harris, Providence; Treasurer, Dr. Timothy Newell, Providence (Dr. F. H. Peckham, Jr., declining a reëlection); Board of Censors, Drs. Ariel Ballou, James H. Eldredge, George Baker, Otis Bullock, Sylvanus Clapp, Welcome O. Brown, David King, J. W. C. Ely.

Dr. O. C. Wiggin, delegate to the annual meeting of the New Jersey Medical Society, reported briefly upon various medical questions discussed there, and of the fraternal attentions received, which made his visit a very pleasant one.

Dr. O. C. Wiggin then delivered the annual address before the society upon the subject of The Causes of Discrepancy in Medical Testimony given in the Courts of Law. The paper of Dr. Wiggin was an able presentation of its subject, showing the difficulties that attend medical and other expert testimony when given in courts, and that discrepancies must exist in such testimony in the very nature of things.

On motion of Dr. C. Parsons the thanks of the society were voted to Dr. Wiggin for his able paper, and a copy requested for publication.

On motion, the meeting then adjourned to the Horse Guards armory to partake of the annual dinner.

The Annual Dinner. — About half past two o'clock, soon after the adjournment of the business session, nearly a hundred fellows of the society met at the Horse Guards armory and sat down to their annual dinner, furnished by Café St. George, with an excellent bill of fare, to the order of the dinner committee, and devoted an hour to a very pleasant experimental discussion of the food question, with practical illustrations, and with good digestion waiting on appetite.

Dr. George L. Collins, anniversary chairman, presided, and called the company to order, while Rev. Carl W. Ernst asked for the divine blessing upon the feast, which all were then invited to partake of, and which they soon properly and very satisfactorily disposed of, each and all pronouncing it a very good "diet" for the occasion. Dr. Collins acted as toast-master.

MEDICAL NOTES.

— The following is an extract from Dr. Holmes's address at the recent public meeting in favor of a park: —

"You will not ask for rhetoric or eloquence in the few remarks upon a vital subject to be offered you by a member of the silent profession. What could be so eloquent as the hollow voice which announces the Boston annual death-rate as being 26.18 against 23.7, that of the great paved nation of London; against 19.3, that of Philadelphia, and approaching that of our two unhealthiest cities, New York and New Orleans? This high death-rate has been shown to be largely due to the excessive mortality among infants and children under five years of age. The most fatal of the diseases which assail them is that destruction which wasteth at noonday, to which our American practitioners give the name of cholera-infantum. And this disease prevails chiefly, almost en-

tirely, from June to October, the season when all out-of-door influences are most tempting and most needed. The weekly record of August and September is that of a pestilence. The destroying angel carries off the first-born, and oftener still the last-born, out of almost every household in certain districts, as in the heaviest curse laid on Egypt. Thousands have fled the city as they deserted London in the season of the plague, but thousands are left to follow in the funeral procession of those who were the hope of their households.

"A considerable part of this mortality, it may be feared, is unavoidable. Our climatic influences are permanent factors, and must always count in the bills of mortality. But there are certain agencies which we can, to a great extent, control. We can and do submit the dwellings of our citizens to inspection and sanitary regulation; we can and shall provide our city with proper drainage; we can and do inspect the food in our market, and condemn it if unfit for use; we can and must secure for our citizens the influences of unroofed and unwalled nature — air, light, space for exercise and recreation, the natural birthright of mankind.

"Of the uses of these larger breathing-spaces which we call parks, for the relief of the imprisoned dwellers in crowded streets, for the recreation of poor and rich alike, for the health of mind and body which they offer to all, it seems almost needless to speak from the medical point of view, for all know what cities would be without open areas where children can play in the shade and old people warm themselves in the sun. I wish to call your attention to a single point intimately connected with the alarming fact of the excessive death-rate of which I have spoken. That point is the influence of the air they breathe on the health of children, with the bearing of this on the question before us.

"If a child is found to have been starved to death in a cellar or an attic, a cry of horror is raised over it. If two or three wandering boys, as it happened the other day at Lowell, come upon some noxious roots, and, in obedience to their omnivorous instinct, devour them and pay the forfeit, the whole country hears of it. If a family or two get hold of some ill-conditioned meat and suffer for it, the groans of their colics are echoed all over the land. If a milkman misrepresents his honest cows by falsifying their product, the chemist detects him and the press puts him in the pillory. If the Cochituate or Mystic water is too much like an obsolete chowder, up go all noses and out come all manner of newspaper paragraphs from 'Senex,' 'Tax-payer,' and the rest. But air-poisoning kills a hundred where food-poisoning kills one."

— At a recent meeting of the Société de Chirurgie, as reported in *La France Médicale* of May 13, 1876, M. Depaul reported a case of cancer of the testicle in an infant of ten months. When eight months old the child, of healthy appearance, was brought to M. Depaul. He then had a cylindrical tumor, solid, situated in the left of the scrotum, continuous with the cord and therefore appearing to lie in the left testicle. It was three centimetres long and two broad. The skin over the testicle was movable, and there was not any effusion into the tunica vaginalis. The diagnosis being doubtful, M. Depaul treated the tumor with resolvents. The infant continued to thrive. He showed no signs of pain, not even when the tumor was touched. One day

the skin of the scrotum became red and adherent to the tumor at one point. Later an abscess discharged at this point, and there remained a fistulous opening, which, gradually enlarging, permitted the protrusion of nearly a third of the tumor. On consultation with his colleagues M. Depaul determined to operate at once. Castration was performed without anæsthesia. It was easily done, the cord being rapidly cut through with the écraseur. There was no hæmorrhage. The age of the child at this time was ten months. Fifteen days later the cicatrization of the wound was nearly complete. The tumor, examined immediately after the operation, showed a wrinkled surface in the protruding part, but it was smooth on its upper aspect. On section it showed a yellowish-white tissue, of which the scrapings gave a cancerous juice. On microscopical examination it was shown to be of a cancerous nature, but of a mixed variety. It was sarcomatous in a portion of the tumor, but for the most part scirrhous.

— *The Medical Press and Circular* states that the *Paris Médicale* discusses the treatment of obesity by the administration of sea-water combined with a residence at the sea-side. Sea-water, taken internally, acts like diuretic and purgative salts, a remarkable fact being that the diuretic effect increases when the purgative diminishes. The water should be obtained, when possible, from some depth, and far from the shore. It is then to be left to settle for six to twelve hours, and filtered. It is to be taken three times a day in doses of a small glassful, or in half that quantity at a time with fresh water or milk. It is stated as a fact that sea-water thus used facilitates the oxygenation of the blood, and that it hastens the eliminationof effete materials. In combination with this treatment sea-water baths are to be taken, free exercise is to be carried out, and at the same time fattening foods are to be avoided. Cases which have resisted other measures are stated to yield to this treatment.

— Drs. Humphreys and Fenner, of Seguin, Texas, report to the *American Supplement of The Obstetrical Journal of Great Britain and Ireland* for May, 1876, a case of a complete septum of the vagina. The patient, a German lady aged nineteen, stout and plump, was taken in labor January 11th. They saw her four days afterwards, and learned that she had been in labor all that time under an old lady's care. She was greatly fatigued, but not exhausted. The head rested above the brim, was in good position, occiput to left, and was freely movable. The os tincæ, dilated to about half the full size, covered the right parietal bone. They changed her position, and presently found the os covering the left parietal, and it was some little time before they noticed that there were two vaginas and two mouths to the womb, with the head resting centrally and heavily against the septum.

The two passages were exactly similar in every respect, and it was clearly impossible to deliver the child through either. Neither the forceps, version, nor craniotomy was available, and the Cæsarean section could hardly be justified where the child showed no sign of being alive. They decided to cut the septum, although they could recollect no authority or precedent for it. The head was pushed back, two fingers passed between it and the septum, a curved, probe-pointed bistoury, carefully guarded, was used, and the septum divided about an inch. A few pains brought the head against the septum, when an-

other inch was cut, and so on until the septum was cut through and the child expelled by the natural efforts. The hæmorrhage from the cut was only an ounce or two, and the woman recovered promptly and without a bad symptom. The child, apparently dead, was revived after long efforts.

The septum was placed antero-posteriorly, commencing at the arch of the pubis, passing down to the fourchette with a free edge, flush with the labia minora, and attached to the perinæum, the walls of the vagina, and the lips of the os uteri, holding the latter nearly in contact. It was about 1¾ inches wide. Its free border in front was almost a feather edge. Higher up it was of uniform thickness, of about 1½ lines in the centre, growing thicker each way to its junction with the vaginal walls. Under the knife it had a fibrous feel, as if composed of sewing-threads. The part between the lips of the uterus was spread out a half-inch wide, either naturally or by the long-continued pressure of the head.

— An association to be known as the American Gynæcological Society was organized in New York on June 3d by the following gentlemen: F. Barker, T. G. Thomas, J. M. Sims, E. R. Peaslee, T. A. Emmett, E. Noeggerath J. E. Taylor, W. T. Lusk, P. F. Munde, of New York; J. Byrne, A. J. C., Skene, of Brooklyn; W. L. Atlee, W. Goodell, R. A. F. Penrose, E. Wallace, A. H. Smith, T. M. Drysdale, J. V. Ingham, of Philadelphia; C. E. Buckingham, A. D. Sinclair, G. H. Lyman, W. L. Richardson, G. H. Bixby, J. R. Chadwick, of Boston; H. P. O. Wilson, W. T. Howard, of Baltimore; T. Parvin, of Indianapolis; E. W. Jenks, of Detroit; R. Battey, of Rome, Ga.; W. H. Byford, of Chicago; G. J. Engelmann, of St. Louis; S. C. Busey, Taber Johnson, of Washington; E. Van de Warker, of Syracuse; J. P. White, of Buffalo; J. M. Trask, of Astoria; J. C. Reeve, of Dayton, Ohio; H. F. Campbell, of Augusta, Ga.

The officers for the first year are as follows: President, Fordyce Barker; vice-presidents, W. L. Atlee, W. H. Byford; secretary, J. R. Chadwick; treasurer, P. F. Munde; council, J. M. Sims, W. Goodell, T. Parvin, G. H. Lyman. The first meeting will be held in New York on September 13, 1876.

— The condition of medical education in Maine is very flourishing. A large and uncommonly good class has recently graduated at Bowdoin, and the Portland School of Instruction has opened with an increased number of pupils. An examination for admission will hereafter be required. The Maine Medical Society met on June 27th and 28th. We hope to give some account of the meeting.

— We take from the *New York Medical Record* the following account of the murder of the superintendent of an insane asylum: "Dr. George Cook, the medical superintendent of Brigham Hall, Canandaigua, was fatally stabbed in the neck by an insane patient on the morning of June 12th, dying the same evening. The patient was a farmer by the name of Benson, who had been but recently admitted, and was not considered dangerous. He seemed to have been impressed with the idea that people were trying to poison him, and that Dr. Cook was endeavoring to administer the poison. Yesterday morning the doctor, in making his usual rounds among his patients, met Benson in his room or in one of the halls. Benson immediately struck the doctor in the

face and neck with a knife. Help was soon at hand and physicians summoned, and strong hopes were entertained for a time that the wounds would not prove fatal. All that medical and surgical skill could devise was brought to bear in the case, but failed, and the doctor died about five P. M. His age was about fifty years. Benson had evidently prepared the knife for the attack on the doctor, as it was found to have been recently sharpened, and he had wound cloth or paper around the handle, so that he could retain a firm hold of the instrument of death."

— We have received a copy of resolutions adopted by a committee of the Abingdon Academy of Medicine on the death of Dr. John P. Mettauer, whose name will be familiar to our oldest subscribers as a contributor to the JOURNAL.

Dr. John P. Mettauer died at his residence at Worsham (the old court house of Prince Edward County), Va., November 22, 1875, in the eighty-eighth year of his age. He entered upon the practice of his profession when about twenty-one years of age, and continued constantly at his post until, a few days before his death, he was seized by the fatal attack of disease, all the while enjoying a large and lucrative practice. During his long life of active labor he won for himself at home and abroad an enviable reputation. By careful study he was enabled to keep pace with the advances of science, with the latest changes in which he was thoroughly familiar. He was highly respected by his professional colleagues, as the accompanying resolutions will show: —

Resolved, That in the death of Dr. John P. Mettauer the medical faculty has lost one of its most distinguished men, the country in which he resided an able and safe practitioner, and the State one of its brightest ornaments in medical science, and his family the honored and revered head.

Resolved, That the Abingdon Academy of Medicine will ever entertain the most profound respect for the memory of Dr. Mettauer, for his high moral and medical character, his great ability as a practitioner and writer, and for his many virtues.

Resolved, That a copy of the preamble and resolutions be sent to the family of Dr. Mettauer, and also to the editors of the *Virginia Medical Monthly*, *Southern Medical Record*, and *Boston Medical and Surgical Journal*.

W. F. BARR,
F. D. KERNAN,
J. S. APPERSON, *Committee*.

LETTER FROM BALTIMORE.

BALTIMORE is situated on the river Patapsco, and at the same time is washed by the waters of the Chesapeake Bay, which, reaching Locust Point (where a narrower passage is formed by the proximity of the opposite shore, Canton), makes a large sweep, extending right up into the heart of the business portion of the city. This is called "the basin," and although filled with steam and sail craft of all sizes and descriptions is shallow, dirty, filthy, muddy, stinking, a bane and an eye-sore to all. For years plans and suggestions, with contrivances of all kinds, from councilmen, merchants, doctors, scientists, have been proposed, some rejected, some tried; but still this horrible nuisance exists

and affords subject for discussion, but that is about all. Learned men say, Beware lest some terrible scourge like Asiatic cholera or yellow fever, once imported, be spread like wild-fire by the miasma arising from the basin, and devastate our city. Others equally learned reply, The basin is the safety-valve of public health, and we regard this water as the only means that would prevent the ravages of such deadly diseases, should they once obtain a foot-hold on our shores. As this point is more or less speculative, we will leave the savants to fight it out on that line or hold it sub cur(e)-ia.

One fact, however, is preëminent: the basin is a nuisance of the first water, and the foul, sickening stench on a hot day extends over the whole city, being more perceptible in the stillness of the night, when the air thus breathed is of a heavy, suffocative character. The plan of emptying large quantities of dead oil into the basin was adopted and carried out by the board of health last year, and answered the double purpose of destroying the stench and quantities of alewives, as well as other fish, whose dead bodies could be seen floating on the dark surface of the water. The experiment, for such the board of health in their report issued in October, 1875, affirm it to have been, was a success so far as destroying the stench was concerned, as was testified to by thousands who had suffered from it before. Our worthy and esteemed health commissioner, Dr. James A. Stewart, was authorized by the mayor to expend the amount suggested, $1000, in abating the trouble, dead oil having been decided upon as cheapest and best after experimenting with all reputable disinfectants at command. The purchase was made at once of four hundred barrels at $2 per barrel, and arrangements effected to empty the dead oil where the odor was most offensive. The amount expended for hire of scows, labor, etc., amounted to about $50. This added to $150 paid for chemical analysis, experiments, etc., makes a total of $1000. This was done in early summer last year; the influence of the dead oil continued throughout the season, modifying, if not entirely destroying the foul odor to such an extent that little or no complaint had been heard from any quarter since that period up to the date of publishing the report, which goes on to state that all this could only be regarded as a justifiable temporary expedient, and should not deter the city council from taking such measures as will, through proper engineering skill, permanently rectify this crying evil.

The plan of directing the course of Gunpowder River through to the basin and thus creating a current, supposing the cause of the evil to be stagnation, is very good theoretically, but does not seem to be practicable, and at present but little is said about it. Silence also reigns supreme about dredging, and so we remain *in statu quo*, talking, writing, arguing, etc., and still the nuisance exists. As regards the causes, there are as many and as different opinions as there have been suggestions and articles about any other phase of what has been elegantly styled by the *Philadelphia Medical Times* as our "Cloacina."

At a recent meeting of the committee on the harbor a plan was brought before them, looking toward an improvement in the present condition of the harbor and especially the basin. Prof. Wm. E. A. Aiken was on invitation present at this meeting of the committee, and laid before them the plan just alluded to, which in his own mind would, if adopted, secure the desired re-

sult of removing the noxious odor and vapors which are continually arising from foul matter in the basin. Professor Aiken gave it as his opinion that the refuse matter flowing from the sugar refineries (of which there are several whose drainage empties into the basin) was to a great extent the cause of all this foulness, and that the stagnant condition of the water must be modified in some way before the desired end could be attained. To remedy this he proposes creating a continual flow of pure water through the basin, by which means the decomposed animal and vegetable substances could be carried out in the river below. This continual flow of water he proposes to obtain from the Patapsco River by constructing a dike at Long Bridge, and in connection with the dike a lock in the manner of a canal lock, which will keep in head a constant supply of water, and at the same time will not cut off river navigation.

From this dike the plan is to lay four or five thirty-inch pipes through which the water is to pass continually, thus creating the current desired. By this means the water flowing from the head of the basin out into the harbor and river below will carry with it all the filth of the basin and render the water pure and the bottom clear. With this current, in the professor's opinion, all surface drainage might be allowed to flow freely into the basin and would be carried off like other matter. Surface drainage is, he believes, far more healthy than underground drainage, and should be continued through the city if possible.

Professor William P. Towry, the chemist at the Maryland Institute, then came before the committee and presented to them his views upon the subject. Professor Towry thought that fully one half the foul matter of the basin came from the drainage of the sugar refineries; on this point, it will be seen, both gentlemen agree. This one cause alone Towry considers sufficient to create the miasmatic vapors and gases which aid in discoloring the bottoms of vessels and are so intolerable at all seasons of the year. The other half of the filth is attributed by the professor to the refuse from sewerage and surface drainage. The organic and acid elements in this refuse unite and generate sulphureted hydrogen, which is the gas so offensive to the nostrils of our citizens. This chemical process goes on at the bottom of the basin, and it is Professor Towry's belief that the current of pure water to be created by Professor Aiken's plan would not be sufficient to carry off the refuse at the bottom and destroy the smell. Professor Towry further said that the only practicable method to remove this offense would be to construct a general receptacle for all sewerage, and by this means to carry it out into the river, shutting off all organic matter from the basin.

The opinions of both professors were listened to with great interest by the committee, who are doing all in their power to discover some plan by which the basin nuisance can be abated. They will not be ready to report to the city council for some weeks.

G. H. B.

Baltimore, *May* 29, 1876.

ERRATUM. — On page 675, eighth line from foot of paper, instead of Foster Hawkins read J. Foster Jenkins.

BOOKS AND PAMPHLETS RECEIVED. — Micro-Photographs in Histology, Normal and Pathological. By Carl Seiler, M. D., in conjunction with J. Gibbons Hunt, M. D., and Joseph G. Richardson, M. D. Philadelphia: J. H. Coates & Co. 1876. Nos. 1 and 2.

Annual Report of St. Mary's Hospital, Quincy, Ill.

International Exhibition of 1876. Hospital Medical Department, United States Army. Pamphlets 1 to 6. (From Surgeon-General's Office.)

THE following is the list of graduates from the Harvard Medical School at the annual commencement, June 28, 1876, with the titles of their theses: —

Fletcher Morton Abbot. Wrist and Foot Tourniquet, invented, made, and described by the writer.

Read Letts Bell, A. M. Pessaries.

William Appleton Bell, A. B. Urinary Calculi.

Frederick Pfeiffer Biggs, M. D. Ventilation.

Edward Young Bogman, A. B. Torsion of Arteries.

Seranus Bowen. Psoriasis.

Charles William Brown. Salicylic Acid in Rheumatism.

Gonzalo Edward Buxton, M. D. The Powerful Influence of Mental Impressions in Remedies.

Arthur Tracy Cabot, A. B. Erysipelas.[1]

George Peters Caldwell. Caries Tarsi.

William Reginald Chipman, A. B. Typhoid Fever.

Frederick Herbert Copeland, A. B. Curara.

Charles Kimball Cutter, A. B. Leucocythæmia.

William Henry Dale. Chronic Bright's Disease.

William McKay Deinstadt. Uterine Hæmorrhage.

William John Gordon Fogg, A. B. Scarlatina.

George Townsend Fox, A. B. Cerebral Hæmorrhage and Apoplexy.

Thomas Waterman Huntington, A. B. Gangrene of the Lungs.

William Leavitt Jackson. Typhoid Fever.

John Henry Kennealy. Hysteria.

Alexander Livingston. Epilepsy, Pathology and Treatment.

Enoch Quimby Marston. Gastric Cancer.

Manuel Masfonoll. Inherited Syphilis.

Cornelius Joseph McCormick. Morbus Coxæ.

Eugene John McGrath. Intestinal Obstruction.

Beverly McMonagle. Acute Dysentery.

Charles John Miller. Sedation and Excitation of Nervous System by Agents.

Frederick Fiske Moore. The Treatment of Acute Rheumatism by Salicyl

Arthur Bennett Morong. Prevention of Scarlatina.

John David O'Connell. Diphtheria.

George Ellis Putney. Valvular Endocarditis.

Samuel Quincy Robinson, B. S. Guinea Worm.

Frank Elmer Tilden. Ætiology and History of Diphtheria.

George Horton Tilden, A. B. Cottage Hospitals.

William Adams Winn, A. B. Excision of Elbow-Joint.

[1] For its acknowledged merit, mentioned by title in the programme of the Commencement exercises.